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24th June 2019

Fatal Accident Investigation Team

Traffic Police Department
Singapore Police Force
10 Ubi Avenue 3
Singapore 408865

MECHANICAL INSPECTION REPORT OF MINI BUS PC 3215Y

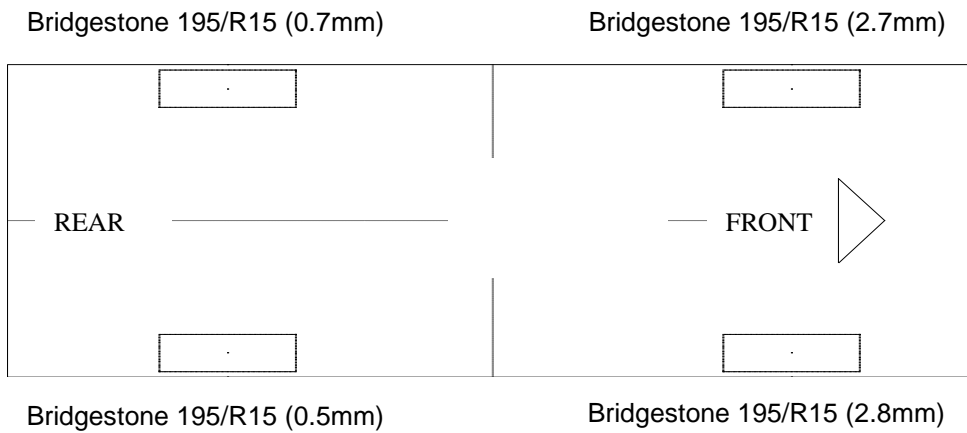
1. I refer to your request on 29th April 2019 to conduct a physical inspection of a Mini Bus bearing registration number PC 3215Y (herein referred to as "**Mini Bus**"), which was involved in a road traffic accident on 13th February 2019.
2. The objective of the inspection is to determine if there was any possible mechanical failure to the Mini Bus that may have contributed to the accident.
3. Following the request, I had carried out a physical inspection of the Mini Bus on 20th June 2019 at the premises of Traffic Police vehicle pound, 517 Airport Road Singapore 539942. I now set out below my observations and comments with respect to this inspection.

General Condition

4. The mileage of the Mini Bus at the time of my inspection was 280,625km.
5. The Mini Bus was observed to have sustained relatively moderate damage at its frontal and left portion. Its front bonnet, front bumper and left sidling door panel and door panel were amongst the body parts that were damaged as a result of the accident.

Tyres and Wheel Rims

6. The condition of the Mini Bus's both rear left and right tyres was observed to be in unserviceable condition due to insufficient tread depth. However the both front tyres was observed to be in serviceable condition. I did not find any tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 4 tyres. The 4 tyres were also observed to be sufficiently inflated for vehicular operation. The tyre brand, tyre size and remaining tread depth of the 4 tyres were recorded as follows:-



7. The 4 tyres were observed to be wrapped around standard steel wheel rims that were found to be without any damage. See photo 1 – 13 below.



Photo 1 shows a general view of the front body of the Mini Bus at the time of my inspection. The Mini Bus was observed to have sustained relatively moderate damage at its frontal and left portion, its front bonnet, front bumper and left sidling door panel and door panel were amongst the body parts that were damaged as a result of the accident. The mileage of the Mini Bus at the time of my inspection was recorded to be 280,625km.



Photo 2 shows a close up view of the damaged front bonnet (circled) and bumper (arrowed) of the Mini Bus at the time of my inspection as a result of the accident.



Photo 3 shows a general view of the damaged left sliding door panel and door panel (circled) and bumper (arrowed) of the Mini Bus at the time of my inspection as a result of the accident.



Photo 4 shows a close up view of the damaged left sliding door panel (circled) of the Mini Bus at the time of my inspection as a result of the accident.



Photo 5 shows a close up view of the damaged left door panel (circled) of the Mini Bus at the time of my inspection as a result of the accident.



Photo 6 shows a general view of the Mini Bus's right body at the time of my inspection. The right portion of the Mini Bus was observed to have been unaffected by the accident.



Photo 7 shows a general view of the Mini Bus's rear body at the time of my inspection. The rear portion of the Mini Bus was observed to have been unaffected by the accident.



Photo 8 shows the condition of the front right tyre of the Mini Bus, which was observed to be in serviceable condition with remaining tread depth of approximately 2.8mm. The tyre was sufficiently inflated for vehicular operation with no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread. The 4 tyres of the Mini Bus were wrapped around standard steel wheel rims without any damage.



Photo 9 shows the condition of the front left tyre of the Mini Bus, which was observed to be in serviceable condition with remaining tread depth of approximately 2.7mm. There was also no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the Mini Bus's 4 tyres.



Photo 10 shows the condition of the rear right tyre of the Mini Bus. The tyre was observed to be sufficiently inflated for vehicular operation with no tear, cut or burst mark(s). However was observed to be in unserviceable condition with remaining tread depth of approximately 0.5mm.



Photo 11 shows the tread depth measurement of the rear right tyre of the Mini Bus. The tyre was observed to be of unserviceable condition with remaining tread depth of approximately 0.5mm, at the time of inspection.



Photo 12 shows the condition of the rear left tyre of the Mini Bus. The tyre was observed to be sufficiently inflated for vehicular operation with no tear, cut or burst mark(s). However was observed to be in unserviceable condition with remaining tread depth of approximately 0.7mm.



Photo 13 shows the tread depth measurement of the rear left tyre of the Mini Bus. The tyre was observed to be of unserviceable condition with remaining tread depth of approximately 0.7mm, at the time of inspection.

Engine Compartment & Operating Fluids

8. Upon examination of the engine compartment of the Mini Bus, I had observed all the parts and components inside the engine compartment to be intact and unaffected by the accident. The brake fluid, engine oil and engine coolant were all found to be of sufficient level for operating purposes. Visually, there was also no contamination found to these fluids.
9. Further examination of the engine compartment revealed no sign(s) or indication(s) of fluid leakage and/or fluid stain within the engine compartment of the Mini Bus.
10. My subsequent checks on the underside of the Mini Bus also revealed no sign(s) or indication(s) of fluid leak and/or fluid stain(s). Visually, the various undercarriage components of the Mini Bus were all observed to be intact and without any visible damage. See photo 14 – 19 below.



Photo 14 shows a general view of the Mini Bus's engine compartment. The various parts and components inside the engine compartment were unaffected by the accident. There was also no sign(s) or indication(s) of fluid leakage and/or fluid stain within the engine compartment.



Photo 15 shows the brake fluid reservoir of the Mini Bus at the time of my inspection. The brake fluid was observed to be of sufficient level and without any visible contamination.



Photo 16 shows checks being carried out to the engine coolant of the Mini Bus at the time of my inspection. The engine coolant was observed to be of sufficient level (arrowed) and without any visible contamination.



Photo 17 shows the engine oil dip stick of the Mini Bus at the time of my inspection. The engine oil was observed to be of sufficient level and without any visible contamination.



Photo 18 shows the power steering dip stick of the Mini Bus at the time of my inspection. The power steering fluid was observed to be of sufficient level and without any visible contamination.



Photo 19 shows the undercarriage of the Mini Bus, at the area where the engine housing and transmission housing are located. I did not find any sign(s) or indication(s) of fluid leak and/or fluid stain(s) on the underside of the Mini Bus.

Braking System & Steering System

11. Static brake tests conducted on the Mini Bus revealed no abnormality. The brake booster had responded well to the various tests conducted. There was also no abnormal movement of the brake pedal when it was depressed. In general, the static brake tests had suggested that there was no internal leakage of pressure/vacuum in the braking system of the Mini Bus. The braking system of the Mini Bus was likely to be in serviceable condition at the material time. This was taking into consideration that the brake fluid was of sufficient level, and also that there was no sign(s) of brake fluid leakage along the brake hoses and brake pipes.
12. Static test on the steering system of the Mini Bus also revealed no abnormality to the steering system. I did not experience any abnormal free play and/or other resistance when turning the steering wheel left and right to full lock positions. My visual examination of the various steering components which had included the steering rack and pinion, tie rods, tie rod ends and ball joints revealed that these components were all generally in good condition. See photo 20 - 25 below.



Photo 20 shows the brake hose/pipe (arrowed) at the rear left wheel of the Mini Bus. I did not observe any leakage of brake fluid at the time of my inspection of the Mini Bus. Static tests of the Mini Bus's braking system had indicated that there was no internal leakage of pressure/vacuum. The undercarriage components of the Mini Bus were also all found to be intact and without any visible damage.



Photo 21 shows the brake hose/pipe (arrowed) at the rear right wheel of the Mini Bus. I did not observe any leakage of brake fluid at the time of my inspection of the Mini Bus. Static tests of the Mini Bus's braking system had indicated that there was no internal leakage of pressure/vacuum. The undercarriage components of the Mini Bus were also all found to be intact and without any visible damage.



Photo 22 shows the brake hose/pipe (arrowed) at the front right wheel of the Mini Bus. No leakage of brake fluid was observed. Visual examination of the various components of the braking system like the brake caliper (circled), brake booster, brake pedal etc had revealed all to be intact and without visible damage.



Photo 23 shows the brake hose/pipe (arrowed) at the front left wheel of the Mini Bus. No leakage of brake fluid was observed. Visual examination of the various components of the braking system like the brake caliper (circled), brake booster, brake pedal etc had revealed all to be intact and without visible damage.



Photo 24 shows the various undercarriage components at the front right wheel of the Mini Bus, in particular the steering tie rod (arrowed). The various steering components were all found to be intact, suggesting that the steering system of the Mini Bus was likely to be in serviceable condition at the material time of accident. There was also no sign of fluid stain observed on the various undercarriage components at the front right wheel of the Mini Bus.



Photo 25 shows the various undercarriage components at the front left wheel of the Mini Bus, which had included the steering tie rod (red arrow) the various undercarriage components of the Mini Bus were all found to be intact without any visible damage.

Electronic Safety / Warning Indicators

13. The Mini Bus 's automatic self-test of the functionality of its various electronic operating systems like the Anti-Lock Brake System (ABS), Electric Power Steering System (EPS), Traction Control (TC) and Supplemental Restraint System (SRS) during cranking of the engine had indicated that these systems were in working condition and without abnormality. This can be established from the warning lights disappearing from the instrument panel after the self-test. See photo 26 & 27 below.



Photo 26 shows the warning light for Anti-Lock Brake System (ABS) and Supplemental Restraint System (SRS) appearing on the instrument panel of the Mini Bus during the self-test of its various electronic operating systems when its engine was cranked.



Photo 27 shows no warning lights illuminated on the instrument panel of the Mini Bus after the engine was cranked. This would suggest that there was no abnormality to the various electronic operating systems of the Mini Bus, like the ABS and SRS etc.

Operational Behaviour of the Mini Bus

14. A short operational test of the Mini Bus , to primarily determine whether there was any abnormality to its engine system, its transmission system and braking system was subsequently carried out.
15. During the operational test, the transmission system of the Mini Bus was able to be shifted to drive mode and reverse mode without any difficulty. There was no abnormal sounds heard and/or abnormal behaviour of the Mini Bus's engine system. It was able to move forward and backward normally. The braking system was also found to be in working condition as the Mini Bus was able to slow down and come to a complete stop upon depressing of the brake pedal. Refer to photo 1 and 28



Photo 28 shows the front left wheel of the Mini Bus turned to its full right. During my steering system test, I did not experience any abnormal free play and/or resistance when I had turned the steering wheel towards the left and right. This would suggest that the steering system of the Mini Bus was likely to be in serviceable condition at the material time of accident.

Conclusion

16. From my physical inspection of the Mini Bus, it appears that its engine system, transmission system, steering system and braking system were all in serviceable condition. I did not find any evidence(s) to suggest that there was possible mechanical failure and/or abnormal behaviour to the Mini Bus that may have caused and/or contributed to the accident.
17. A short operational test of the Mini Bus, which I had conducted, did not produce any sign(s) or symptom(s) to suggest that there was any abnormality to its engine system, its transmission system and braking system.

18. The condition of the Mini Bus's both rear right and left tyres was observed to be in unserviceable condition due to insufficient tread depth of 0.5mm and 0.7mm. However, both front tyres were observed to be in serviceable condition with a tread depth of right 2.8mm and left 2.7mm. I did not find any tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 4 tyres. The 4 tyres were observed to be sufficiently inflated for vehicular operation. Refer to photos 8 - 13

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